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09/714,373	11/16/2000	David J. Alcoe	END92000094US1	5007

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EXAMINER

LINDINGER, MICHAEL L

ART UNIT PAPER NUMBER

2841

DATE MAILED: 12/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/714,373

Applicant(s)

ALCOE, DAVID J.

Examiner

Michael L. Lindinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,3-20 and 22-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The Examiner acknowledges the corrections made to the Specification concerning the Amendment filed on February 8, 2002. The corrections have been noted and the Examiner's objections regarding this material are withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 20, 22, 26, 28, 31-41, 43-44 are rejected under 35 U.S.C. 102(b) as being unpatentable by Appelt U.S. Patent No. 5,900,675. Regarding Claim 1, 20, 31, 37, and 43, Appelt teaches a connector system comprising a first substrate 620 of a first coefficient of thermal expansion, a second substrate 630 of a second coefficient of thermal expansion, a flexible connector 610/640, at least three contacts 612, 613 formed on a first surface of the substrate, and at least three contacts 631-634 formed on a second surface of the substrate, wherein select contacts on the first surface of the substrate are alternatingly offset from select contacts on the second surface of the

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substrate, wherein the coefficient of thermal expansion of the connector is midway between the first and second coefficient of thermal expansion of the first and second substrates, respectively (Col. 4, lines 8+; Col. 5, lines 58+; Col. 6, lines 1+; FIG. 6).

Regarding Claim 22 and 44, Appelt teaches a connector system wherein the laminate material comprises a core, a compliant, dielectric material surrounding the core, and a solder mask (Col. 5, lines 58+; Col. 6, lines 1+; Col. 7, lines 1+; FIG. 6).

Regarding Claim 26, Appelt teaches a connector system wherein the core comprises a material selected from the group consisting of copper-invar-copper, copper, stainless steel, nickel, iron, and molybdenum (Col. 6, lines 1+; Col. 7, lines 1+; FIG. 6).

Regarding Claim 28, Appelt teaches a connector system wherein the contacts comprise ball grid array connections (Col. 5, lines 58+; Col. 6, lines 1+).

Regarding Claims 32-41, Appelt teachings inherently possess the methods of fabricating an electronic device and connector system and the corresponding mounting and assembling steps needed to construct the apparatus.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 3, 4, 8, 10-12 and 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appelt U.S. Patent No. 5,900,675 in view of Lee U.S. Patent No. 6,050,832. Regarding Claim 3, Appelt teaches a connector system comprising a first substrate 620 of a first coefficient of thermal expansion, a second substrate 630 of a second coefficient of thermal expansion, a flexible connector 610/640, at least three contacts 612, 613 formed on a first surface of the substrate, and at least three contacts 631-634 formed on a second surface of the substrate, wherein select contacts on the first surface of the substrate are alternatingly offset from select contacts on the second surface of the substrate, wherein the coefficient of thermal expansion of the connector is midway between the first and second coefficient of thermal expansion of the first and second substrates, respectively (Col. 4, lines 8+; Col. 5, lines 58+; Col. 6, lines 1+; FIG. 6). Appelt does not explicitly teach at least three alternatingly offset contacts from a neutral point. Lee teaches an apparatus comprising a first substrate 14, a second substrate 10, a flexible connector 218 attached between the first and second substrates by a plurality of contacts on a first and second surface of the connector, wherein all of

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the contacts on the first and second surfaces alternate in respect to each other. This statement of "all of the contacts" would also encompass the limitation of "at least three contacts" and also the limitation of "at least three contacts in succession" (Col. 6, lines 63+; Col. 7, lines 1+; FIG. 3B). Lee teaches the general principle of alternating contacts in order to reduce stress within a multiple substrate and connector arrangement; however, Lee does not explicitly teach the details of that arrangement. Appelt teaches an electronic device wherein the connector comprises a laminate material, as well as the features included in the following rejections. It would have been obvious to a person skilled in the art at the time of the invention to provide additional contacts to the Appelt reference arranged in an offsetting manner to further reduce thermal expansion with the substrates. By utilizing common material in forming the connector and contacts, the conductivity will only increase as is expected when those materials are used.

Regarding Claim 4, Appelt teaches an electronic device wherein the laminate material comprises a core, a dielectric material surrounding the core, and a solder mask (Col. 5, lines 58+; Col. 6, lines 1+, Col. 7, lines 1+; FIG. 6).

Regarding Claim 8, Applet teaches an electronic device wherein the core comprises a material selected from the group consisting of copper-invar-copper, copper, stainless steel, nickel, iron, and molybdenum (Col. 6, lines 1+, Col. 7, lines 1+).

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Regarding Claim 10, Appelt teaches an electronic device wherein the contacts comprise ball grid array connections (Col. 5, lines 58+).

Regarding Claim 11, Appelt teaches an electronic device wherein the first substrate comprises a chip package 630 (Col. 5, lines 58+).

Regarding Claim 12, Appelt teaches an electronic device wherein the second substrate comprises a printed circuit board 620 (Col. 5, lines 58+).

Regarding Claims 32-36, the combination of the Appelt and Lee teachings inherently possess the methods of fabricating an electronic device and connector system and the corresponding mounting and assembling steps needed to construct the apparatus.

2. Claims 5-7 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appelt U.S. Patent No. 5,900,675 in view of Lee U.S. Patent No. 6,050,832 in further view of Nguyen U.S. Patent No. 5,477,933. Regarding Claims 5-6 and 23-24, as described in the previous rejections above, the combination of Appelt and Lee teaches a laminate material, but not a laminate material with through holes. Nguyen teaches a laminate material with plated through holes 19 that provide electrical connection between at least one contact on the first surface 12 and one contact on the second surface 23 (Col. 3, lines 25+; FIG. 1, 3). It would be obvious to a person skilled in the art to provide the laminate material within the application through holes in order to provide

electrical connection between the two surfaces. By connecting the through holes by a conductive path, the solder contacts are provided increased strength and durability in protection against detachment as well.

Regarding Claims 7 and 25, Appelt teaches an electronic device with a connection layer. Appelt does not teach a ground shield over the connection layer. It would be obvious to a person skilled in the art to include a ground shield over the connection layer in the present application in order to provide additional impedance control for the apparatus. By definition, a ground or ground shield protects against any type of static discharge or a surge in current, therefore including a ground shield to the current application does not constitute a patentable improvement to the invention.

3. Claims 9 and 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Appelt U.S. Patent No. 5,900,675 in view of Lee U.S. Patent No. 6,050,832 in further view of Distefano U.S. Patent No. 6,309,915 B1. Regarding Claims 9 and 27, as mentioned in previous rejections above, the combination of Appelt and Lee teaches a dielectric layer, but does not teach a dielectric layer comprising polyimide. Distefano teaches a dielectric layer comprising polyimide (Col. 8, lines 55+; Col. 10, lines 17+). It would be obvious to a person skilled in the art to fabricate the dielectric layer for the current application out of polyimide. By choosing to have the dielectric layer comprising polyimide, the flexibility of the dielectric layer is increased and done so with a common polymeric material such as polyimide.

4. Claims 13-19, 29-30, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appelt U.S. Patent No. 5,900,675 in view of Lee U.S. Patent No. 6,050,832 in further view of Sheppard U.S. Patent No. 6,284,569 B1. The combination of Appelt and Lee does not teach a stiffener frame. Sheppard teaches a stiffener frame 100 providing stiffening for an integrated circuit package further comprising a stiffener frame that is attached to and surrounds the perimeter of a substrate or connector, wherein the stiffener is adhesively or removably attached to the substrate, wherein the stiffener frame comprises a material selected from the group consisting of: plastic, metal, and ceramic (Col. 1, lines 57+, Col. 2, lines 6+). It would be obvious to a person skilled in the art to include a stiffener frame to the Appelt/Lee combination in a manner to not only insure a more rigid and secure electronic device, but to also act as a heat sink in the thermal dissipation of excess heat from the chip package. It can be assumed that as long as the general structure, which comprising the stiffener adhesively attached to a planar laminate by means of an acrylic adhesive material, then the properties of a heat sink will be achieved. Also, by including a stiffener frame, the chance for detachment of substrates between one another and overall damage due to handling is decreased.

Prior Art

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Jimarez U.S. Patent No. 6,191,952 B1 discloses a flip-chip electronic package comprising a compliant surface layer included on an interconnect carrier including a solder mask, a chip, a substrate, or printed circuit board, and solder balls arranged in a ball grid array to connect the chip to the carrier to the substrate.
- Susko U.S. Patent No. 6,177,728 B1 discloses an integrated circuit chip device comprising a chip, a carrier comprising a thermoplastic material layer, a glass filled epoxy layer, and an elastic layer, a printed circuit board, and solder balls arranged in a ball grid array to connect the chip to the carrier to the printed circuit board.
- Caletka U.S. Patent No. 6,104,093 discloses a thermally enhanced flip chip package comprising a chip and a laminate substrate electrically connected to the chip by means of solder balls.

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- Iwasaki U.S. Patent No. 5,834,848 discloses an electronic device and semiconductor package comprising substrates of different coefficients of thermal expansion values.
- Kamath U.S. Patent No. 6,317,331 B1 discloses a wiring substrate with a thermal insert, wherein the insert has a different coefficient of thermal expansion value than the substrate that it is inserted to, thereby reducing the expansion of the substrate when under environmental conditions.
- Jackson U.S. Patent No. 6,333,563 B1 discloses an electrical interconnection package and method thereof comprising multiple substrates with contacts arranged in an alternating pattern.

Response to Arguments

Applicant's arguments filed October 23, 2002 have been fully considered but they are not persuasive. Regarding Claims 1, 20, 31, 37, and 43, Appelt teaches a first substrate 620 with a first coefficient of thermal expansion of 15-25 ppm/C°. Appelt teaches a second substrate 620 with a second coefficient of thermal expansion of approximately 2 ppm/C°. Appelt further teaches a flexible connector with a coefficient of thermal expansion value (7 ppm/C°) approximately midway between the first and second coefficient of thermal expansion values respectively (Col. 4, lines 8+). For the foregoing reasons, Claims 1, 20, 31, 37, and 43 continue to be anticipated by the Appelt reference. Accordingly, the Examiner's rejection over the Appelt reference under 35 U.S.C. 102(b) is upheld.

Regarding Claims 3-19, 22-30, 32-36, 38-42, and 44, the Applicant fails to specifically point out how the language of these Claims patentably differentiates themselves from the applied art and thus the rejection is repeated.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael L. Lindinger whose telephone number is (703) 305-0618. The examiner can normally be reached on Monday-Thursday (7:30-6).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on (703) 308-3121. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.

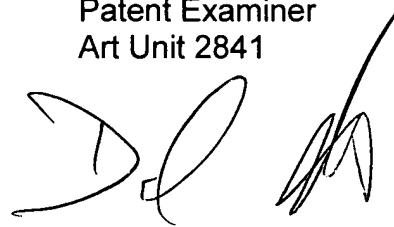
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Michael L. Lindinger
Patent Examiner
Art Unit 2841

MLL
December 19, 2002

A handwritten signature in black ink, appearing to read 'DAVID MARTIN', is written over the printed name and title.

DAVID MARTIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800